Two Rivers Trail

Changes in the Algonquin Forests

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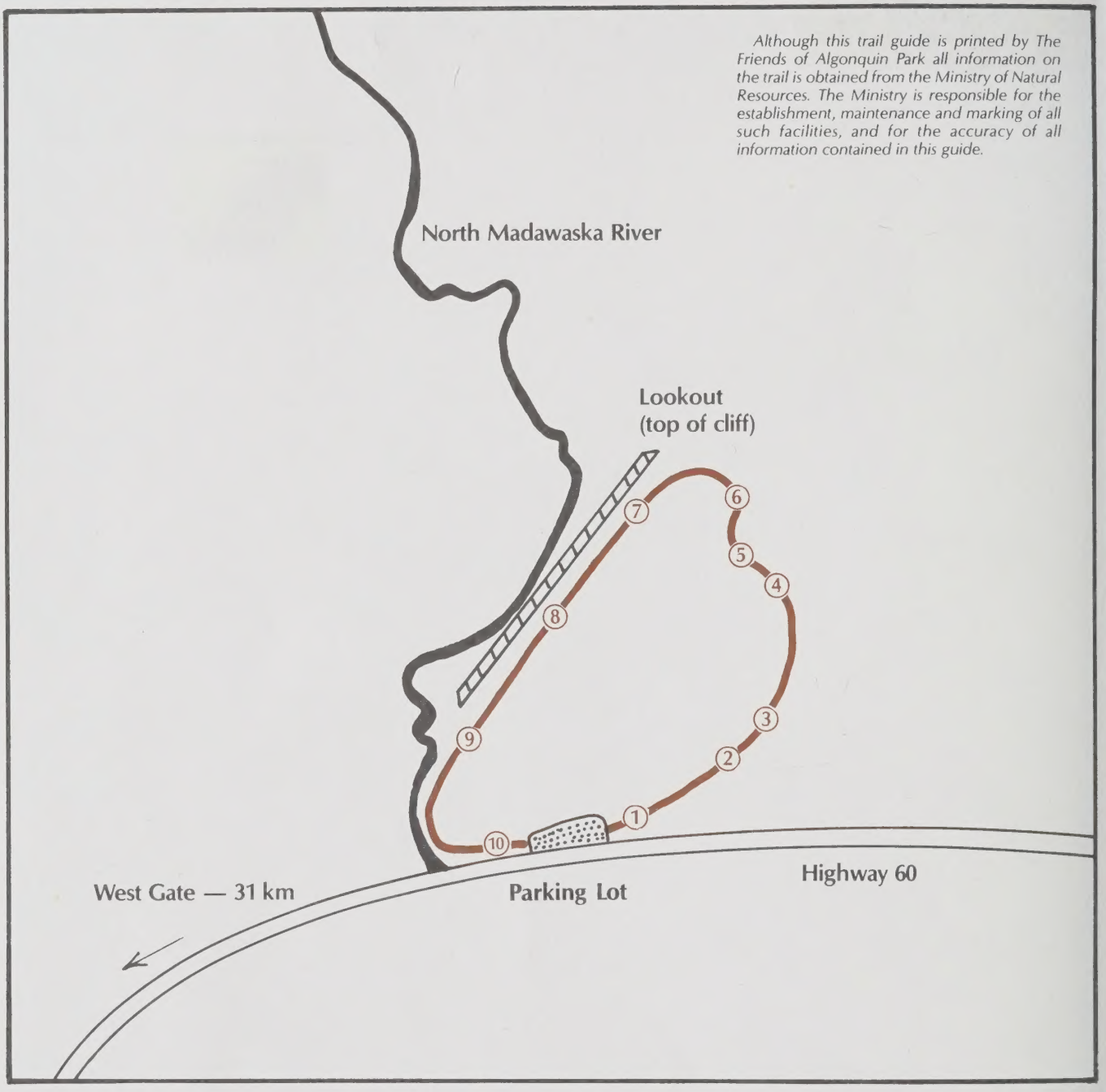


The Two Rivers Trail is a 2 km loop featuring a pleasant walk through a young Algonquin forest and leading to a clifftop overlooking the North Madawaska River.

The numbered sections of this guide correspond to numbered posts along the trail and offer some insight into the importance of change in the natural and present-day Algonquin forests.

Post 1 Is This the Forest Primeval???

Many visitors to Algonquin automatically assume that the Park forests are thousands of years old and that they have been untouched by man. The truth is that our local forests are no different from the ones outside the Park. All have been profoundly affected by man over the last 150 years and, often, what we see today are completely new stands that have grown up after the original destruction of the original forest by logging and fires.

Along this trail you can still see rotting pine stumps that remind us of how these changes began. In the early years of the last century a market developed in Britain for the huge Red and White Pines growing in eastern Canada. Each winter more and more men pushed farther into the wilderness, felling the giant trees by axe during the day and retreating to primitive, isolated camps at night. When spring came they floated the great timbers down rivers to the outside world and then, the following winter, they would return and push even farther upstream. They reached this Lake of Two Rivers area of the Madawaska River system, for example, sometime in the late 1870's, twenty years before Algonquin was declared a Park. The technology of these early loggers was primitive but their impact was enormous all the same. Hundreds of thousands of trees were removed and, even more important, fires ignited in pine slash left by the loggers burned large areas of the timber that remained. As we shall see farther along the trail, the resulting changes in the forests and wildlife of Algonquin were enormous.

The forest you are standing in may be interesting and full of life but it certainly isn't the forest primeval.

Thousands of rotting stumps like this date from the pioneer logging days of the last century.

Post 2 A Boom or a Bust

A spruce budworm caterpillar feeding on white spruce (4 times life size).

Although we humans have brought about some startling changes in Algonquin Park forests during the last 100 years, it would be wrong to think that forests lived "forever" before we came along.

In the natural forest there were other agents at work, slowly turning over succeeding generations of trees and shaping the character of wilderness.

One such natural agent of change was insects, and in Algonquin the most important was, and is, the spruce budworm. A good example of the budworm's work is provided by the dead trees at this post — mostly Balsam Fir that were attacked by a major budworm outbreak in the early 1970's.

The adult budworm is a drab grayish moth. It lays its green eggs in July on the foliage of spruce and balsam. When the larvae hatch ten days later, they spin tiny silk cases in which they remain inactive through the winter. Emerging in spring, the larvae mine their way into the tree's needles, voraciously feeding and growing until they are ready to transform into adults. Since spruce and Balsam keep their needles for three or four years, a severe budworm attack lasting that long will completely defoliate the tree and kill it. Such prolonged attacks spell disaster for the spruce and Balsam trees over wide areas, but for birds such outbreaks can be a fantastic bonanza.

At the peak of the outbreak which killed the trees you see here, bird populations reached record levels. Not only were their numbers high, but they also had unprecedented success in raising young. There was so much food, in the form of budworm larvae and moths, that some bird species nested twice, bringing off both broods quite easily, where in a non-budworm year they would be hard-pressed to complete one nesting.

Yet another consequence of the budworm outbreak was the presence of different kinds of birds — kinds which simply wouldn't have been here had it not been for the budworms. The most striking of these budworm-dependent birds is the Cape May Warbler, a jewel in the treetops, which appears "out of nowhere" to become one of the common breeding spe-

cies during a budworm outbreak. And yet, in non-budworm years, the Cape May Warbler is extremely rare, or altogether absent.

This shows that spruce budworm outbreaks have been part of the natural scene for many thousands of years and that other forms of wildlife have even become adapted to such attacks. It is interesting to think that the forests of Algonquin already had a "boom or bust" economy even before we humans came on the scene.

Cape May Warblers thrive during budworm outbreaks.

Post 3 Is it a Plague . . . or a Ray of Sunshine?

When budworms eat their way through four consecutive years of new needle growth they kill or severely damage their hosts and then the outbreak subsides. The high populations of birds that capitalized on the budworm bonanza also start to go down and revert to their normal levels.

But this does not mean that the influence of the budworm outbreak upon the forest is over. As the dead trees decompose, they are attacked by wood-eating insects which in turn support woodpeckers, nuthatches, and other birds. At the same time, the defoliation of the trees results in increased amounts of light, warmth, and moisture on the forest floor. This promotes the growth of various flowers and shrubs as well as new White Birch and aspen trees. In other words, the death of the old Balsam and White Spruce stands is followed by a nutritious flush of new growth that benefits many birds and mammals. Deer or moose browse on the new growth, and shrub-inhabiting warblers move in to nest. Down on the ground itself, the Red-backed Vole, which eats berries and succulent plant parts, will thrive in the ideal conditions resulting from the budworm-induced death of the old stand.

Eventually the pulse of new wildlife subsides but the budworm outbreak has another impact on the forest that remains visible for decades or even centuries. Although the spruce budworm does indeed attack spruce trees it is much more devastating to Balsam Fir. In a typical atttack, Balsam Fir is virtually annihilated over wide areas whereas a few White Spruce trees and seedlings survive. This is of crucial importance to the spruce because, under normal conditions, it is hopelessly outclassed in the struggle for survival by the more prolific and faster growing Balsam. Over large areas, we can thank spruce

The budworm kills trees but helps maintain spruce in our forests.

budworm outbreaks for periodically knocking Balsam Fir out of the picture and giving the White Spruce a brief but all-important chance to establish a new generation before the Balsams close in on them once more. The spruce budworm is not the enemy of spruce trees — it is what allows them to stave off elimination! Given that spruce are of fundamental importance to the Canadian economy, this fact is of major significance.

The sight of large stands of dead, budwormed trees in Algonquin fills many people with a kind of horror. It really shouldn't, however, because as we have seen, budworm attacks bring highly beneficial flushes of new and different life to the forest that just wouldn't occur any other way. You could also say that budworm attacks serve to spruce up our forests.

The red-backed vole does well in the new growth.

Post 4 Is Smokey out to Lunch?

The spruce budworm was one major agent of change in the original Algonquin forest — and fire was another.

The direct evidence is now just about all gone but, back in the 70's, you could still see fire-charred stumps here and at other places along the trail dating from this area's last major fire around 1900. That was a time when large areas of the Park burned every year because humans were then almost helpless against fires.

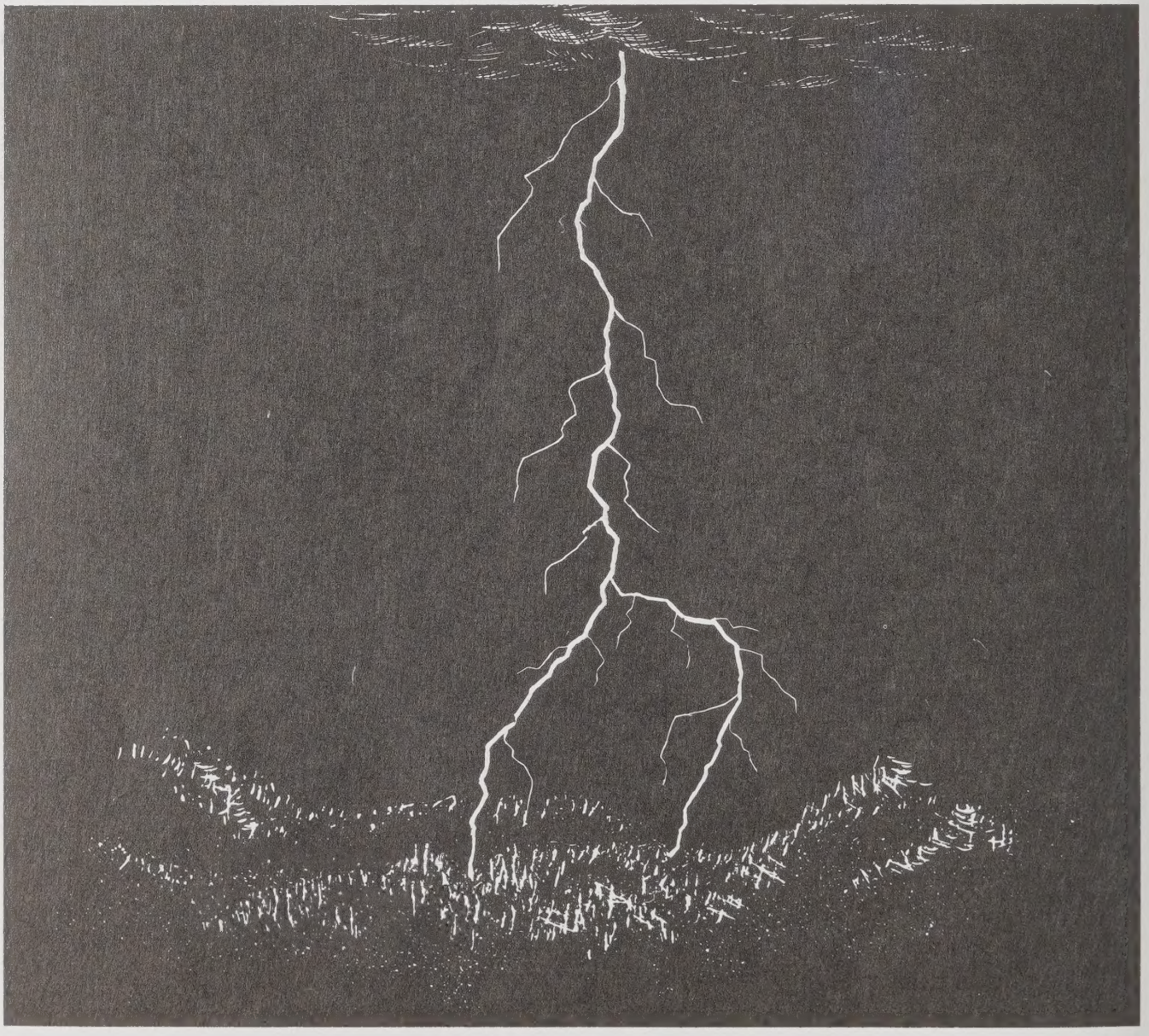
Today, things are different. Although an average of 50 fires get started every year in the Park, it is very unusual for all of them combined to burn more than a hundred hectares. This is a negligible amount in the 7600 square km of Algonquin. Nowadays, the first wisp of smoke above the horizon gives a fire away and it is pounced on by trained crews with highly efficient equipment and procedures. This policy is just about universally accepted. We have all been taught that "fire is the forest's greatest enemy," and Smokey the Bear has warned everybody that "Only YOU can prevent forest fires."

Well, Smokey is a great guy but sometimes he is quite off the mark. Today, human carelessness is responsible for the majority of forest fires, but every year about

15 fires are started in Algonquin Park by lightning. That means (whether Smokey likes it or not) that in the complete absence of man there would be well over 1,000 natural fires in Algonquin Park every century.

The question is not whether fire was a natural part of the Algonquin environment, but "How much fire was natural?". Although we have a good idea of the number of lightning-started fires occurring each year, we cannot now say how much of the Park burned each year or how often a given area was burned each century. We do know, however, that the modern era of efficient fire suppression began about 1936 and that since then we have "deprived" Algonquin of over 500 natural fires. At least a few of these would have burned large areas.

In the last century, man was responsible for a situation in which there were far more than the normal number of forest fires. In this century he is responsible for a situation in which almost every fire is put out. Both situations are equally unnatural.



Post 5 Just Ask A Deer

We often think of fire as the deadly enemy of wildlife, but if deer could talk they would tell you just the opposite. Strange as it may seem, deer were originally quite rare in Algonquin. They only became common in the last century after man stepped up the frequency and extent of forest fires, thus creating large areas of

good deer food.

Big fires started by both man and lightning continued to produce good future deer habitat long after the park was created, with an average of 65 square km being burned every year between 1921 (when accurate records were first kept) and 1936. After this date, however, more men, planes, and other efficient means of fire fighting came into operation — with the result that the average area burned each year dropped to less than five square km.

This has meant that the food supply for Algonquin's great deer herd has not been replenished in any significant way for over half a century. Understandably, the Park can therefore support far fewer deer than it once did.

You often hear it suggested that the virtual disappearance of fire should not be all that important to deer because we still have logging which also creates openings in the forest and new shrubby growth. The trouble is that fire did it far better. Researchers have found that typical logged areas (with only scattered, big trees removed) produce only about 18,000 stems per hectare, whereas severe burns produce as many as 60,000 stems per hectare. What's more, the aim of most modern forest management is to grow new trees as quickly as possible, so the new trees in a logged area should climb out of a deer's reach much faster than they did in the old burns (where competing shrubs slowed down the growth of new trees).

The upshot of all this is that modern forest management and the virtual elimination of fires have combined to transform the scrubby forests of 60 years ago back to a condition more like the original one where there were few or no deer.

And if deer had it tough before the day of man-caused fires, we can't expect them to do better in a modern age where we humans put out even the natural ones caused by lightning.

Post 6 Generation Gap

If you look around at this post you will see that there are two main kinds of trees — the broad-leaved aspens and birches on the one hand, and the evergreen pine, spruce, and Balsam on the other.

You are actually witnessing a transition from one generation of trees to the next. Near the end of the last century, this part of the Park had been logged and then burned. The sunlit treeless ground was quickly colonized by young Trembling Aspen and White Birch.

Both species do very well in open sunny conditions. Indeed they must have lots of sunlight — which is why their hold on an area is only temporary. Young aspens and birch simply cannot grow in the shade cast by their parents. As a result, more shade tolerant species such as White Pine form a second generation "understory," growing up under the pioneer birch and aspen. As the aspen and birch grow old and die out, their place is taken by the pine and spruce — which is what is happening right here.

All this makes for a pronounced generation gap. The first and second generation forests have drastic differences in appearance, and in the kinds of plants, animals, and birds which they support. Generally speaking, the earlier generation, especially the aspen, is more favourable for many of the better known mammals. Deer, moose, and bear (hope Smokey reads this) all browse heavily on aspen leaves. The bark of the same tree is the favourite food of the beaver and the porcupine. In winter, grouse feed heavily on the buds of aspen and birch.

Situations like this teach us two interesting things. The first is that fire and the other "destructive" forces must be regarded as part of the natural Algonquin environment — or there wouldn't have been any aspen, birch, or other species adapted to the sunny, open conditions these agents create. Second is the fact that since fires pave the way for stands of aspen that are good for animals, it therefore follows once again that, instead of being catastrophes, fires are actually beneficial to wildlife.

Pine, spruce, and balsam grow underneath the pioneer generation of aspen and white birch.

Post 7 The Great Fertilizer

A severe burn is devastating but paves the way for new trees and wildlife.

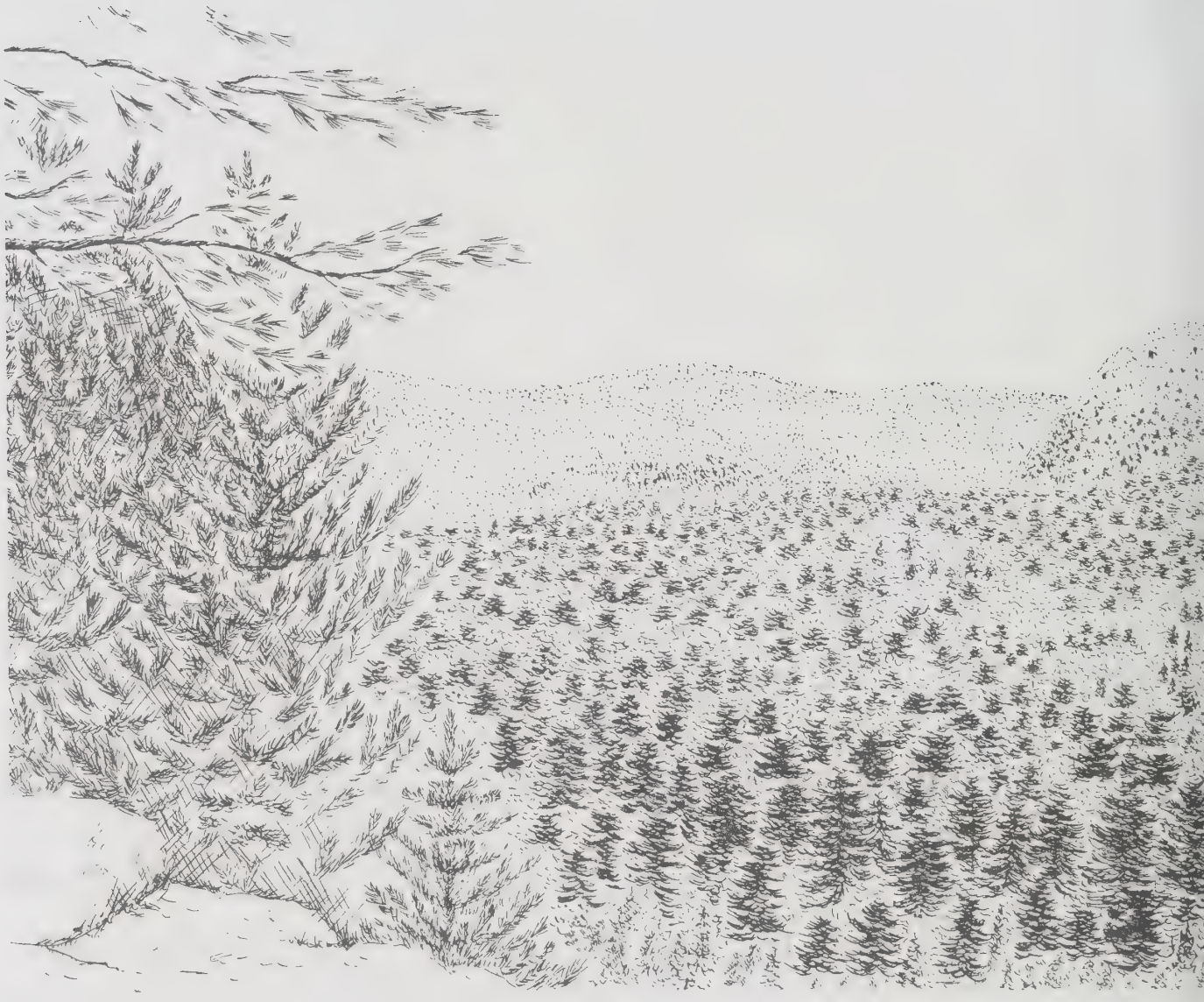
The little patch of ground in front of you was burned in 1972 — probably because one of your fellow hikers was careless with a match or cigarette. This fire, like almost all others nowadays, didn't really get very far. It blackened only a few square metres and killed just one small spruce — so you'll have to rely on the illustration to get some idea of what a recently burned area looks like.

Such an area seems pretty desolate, but it is worth remembering that such scenes were frequent and quite natural in the original Algonquin landscape. What is even more important is the fact that fires created very special conditions which many plants and animals are adapted to take advantage of.

To be sure, high winds, the spruce budworm, and man can all remove a forest and create open sunny conditions — but fires do much more. To begin with, after a fire, the moisture content of the soil surface is lowered, but in the layer immediately below, the water content is higher than on unburned land. It is in this second layer that young plant roots become established, so fires actually create more favourable moisture conditions for the new growth that follows the destruction of the old.

A second change brought about by fires is the increase in the nutrients available to new plants. The ashes left by a fire sift in, dissolve and leach into the soil, increasing phosphate, potash, nitrogen, and calcium for several years afterwards. "Fire, the great destroyer" is also "Fire, the great fertilizer."

The most important change of all, however, is the burning of the forest floor itself. In an undisturbed forest, the ground is covered by a thick layer of leaves and twigs in varying stages of decomposition. This layer, called duff, is a normally insurmountable barrier to the weak seedling roots of many tree species including two important kinds you will see at the next stop. It is only because forest fires removed the duff, exposing loose mineral soil, that such trees were ever able to perpetuate themselves in the natural environment.



Post 8 From Little Fires, Mighty Pine Trees Grow

At the last post we hinted that some kinds of trees just wouldn't be here if fire hadn't prepared the right kind of seed bed for them. You don't have to look far to see such trees. The White Pine forest across the river below you and the Red Pine trees to your left along the trail both owe their existence to fire.

The fact that these two familiar tree species depend on such a "destructive" force is rather surprising. You will remember that what attracted men to Algonquin Park in the first place were the stands of giant pine. At that time they dominated the Park landscape either in pure stands on sandy plains or scattered among the hardwoods on hilly western sites. The point is that these towering pines, and indeed the coniferous element of Algonquin generally, were often there only because of forest fires which had prepared seedbeds for them. The Park was the way it was because fires made it that way. Far from being an unnatural and undesirable disaster, forest fires played a vital role in shaping the character of the original virgin forests of Algonquin.

Research has shown that the same was true in virtually all the coniferous forests of North America and many of the deciduous environments as well — from the Everglades in Florida to the spruce forests of Alaska. For this reason fire has been reintroduced in such places as Yellowstone and Sequoia National Parks in the U.S.A. These areas were set aside to preserve parts of the natural environment and it is now clear that without fire the forests and the dependent wildlife in these parks would change to

Stands of pine often owe their presence to forest fires.

something quite different from what they were before man started interfering with nature.

Our traditional view of forest fires has been that they are terrible catastrophes that we would be much better off without. It really depends, however, on what we want to do with our forests.

If we wish to use the wood, then fire must be seen as an enemy. After all, we can't use the wood if it has gone up in smoke. The exclusion of fire does create a problem in the regeneration of pine species, but there are ways around it. We can prepare mineral seedbeds by disturbing the duff layer with heavy chains or other devices dragged behind bulldozers. This method, and direct planting of new pine stock, are both being used in parts of Algonquin today.

In other parts of the Park, the wilderness zones, the primary management aim is not the production of wood but the preservation of the natural order. We have seen that lightning fires were very much a part of that natural order and so putting out natural fires in wilderness zones is just as inappropriate as logging and partly defeats the purpose of the zones.

Algonquin's official 1974 Master Plan called for the restoration of fire to the Park's wilderness zones but this policy has never been implemented. Needless to say, there are difficult problems with letting fires burn and so far they haven't been solved to everyone's satisfaction. We'll probably have to wait a long time before we see fire resume its natural role in the Park environment.

Post 9 Windfall Profits

Occasional violent windstorms are an important agent of change in the forest.

The dead trees lying on the forest floor around you at this post lost out to the standing trees in the competition for sunlight. They succumbed to disease, died, and eventually were blown over in a storm.

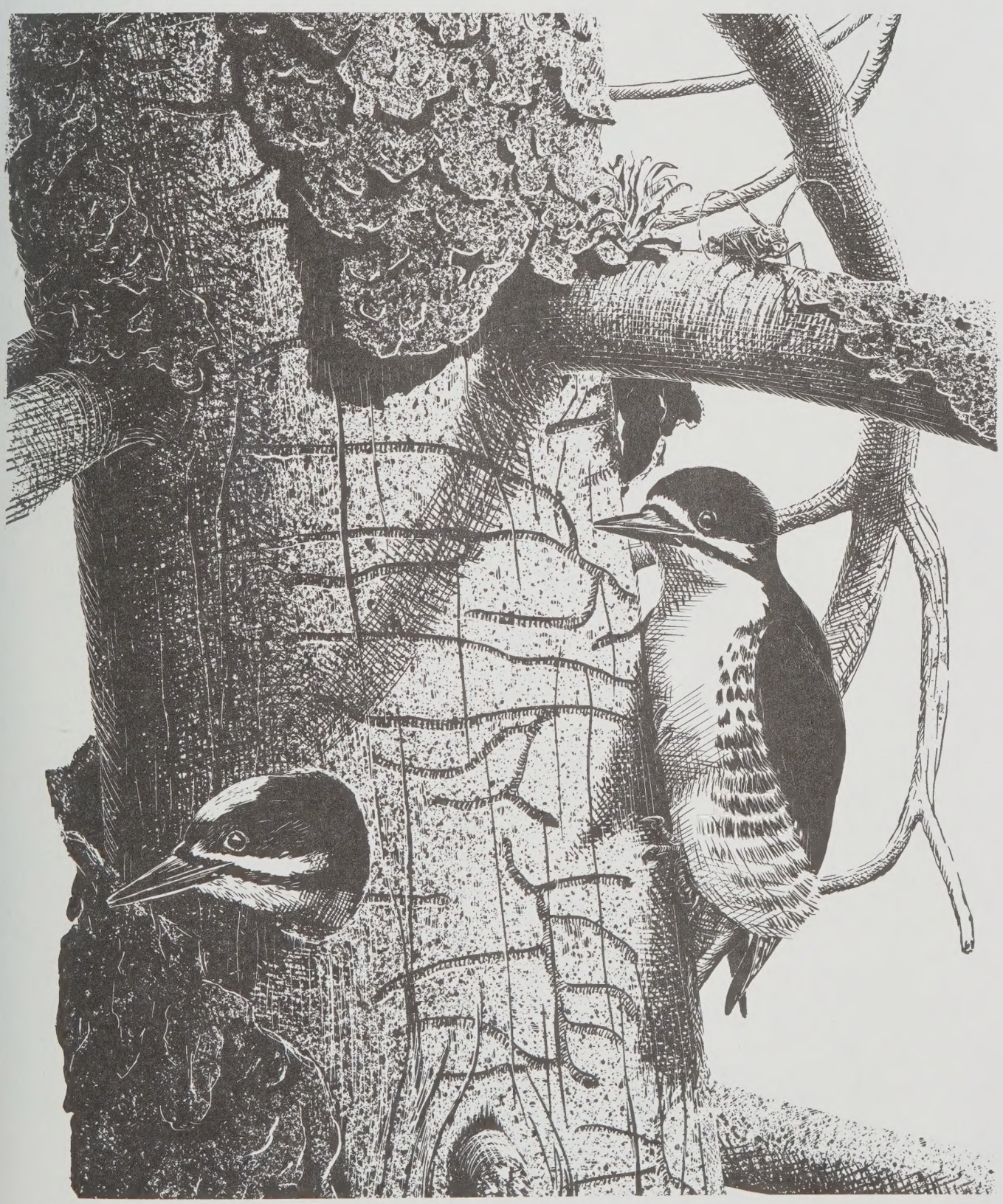
Being toppled by strong winds is the normal fate of dead trees but occasionally great swaths of mature, live timber in Algonquin are levelled by tornadoes or other powerful storms. In the 25 years, 1963 to 1988, for example, there were many minor, and four major, violent windstorms which flattened parts of the Park. (The two largest cut swaths 25 km long and almost one km wide.) At that rate of occurrence, it is obvious that a large percentage of the Park would be significantly influenced by wind every century or two.

"Blowdown" may be especially important in the hardwood forests of Sugar Maple, Beech and Yellow Birch covering most of the west side of Algonquin. Undisturbed, these forests normally tend to become more and more dominated by Sugar Maple because the seedlings of this species are best adapted to penetrating the thick layer of leaves on the forest floor and then growing in the dense shade of the mature trees. Unlike our coniferous forests, the hardwoods of Algonquin do not burn well, nor are they subject to devastation by insect attacks. This leaves wind as virtually the only agent capable of knocking out pockets or big swaths of the hardwood forest.

When this happens, the blowdown area may look like a battle scene but it has conditions which are especially favourable for tree species other than the normally dominant Sugar Maple.

Yellow Birch and White Pine, for example, benefit from the extra sunlight but also from the uprooting of the old trees and the resulting patches of disturbed mineral soil. In these patches, and later right on the rotting tree trunks themselves, there is little or

no layer of matted leaves and so the seedlings of these tree species have a good chance of getting established there. If they do, they owe their lives to the violent winds that removed the Sugar Maples and prepared a place for them to take root and grow.



Black-backed Woodpeckers nesting in a Balsam Fir killed by budworms.

Post 10

We hope you have had a pleasant walk around the trail and enjoyed learning about the importance of change in the forests of Algonquin Park.

If you do not intend to take the guide home with you, please place it in the box at this post so that others may use it later. Thank you.

Other Algonquin Trails

This is just one of 12 interpretive trails maintained in the Parkway Corridor of Algonquin Provincial Park. Each is designed to introduce you to some specific aspect of the Park and each has a guide similar to this one. The 11 other trails are listed below (distances are from the West Gate).

WHISKEY RAPIDS TRAIL (AT KM 7.2) This trail is a 2.1 km loop leading along the Oxtongue River to scenic Whiskey Rapids. The trail guide discusses the ecology and history of an Algonquin river.

HARDWOOD LOOKOUT TRAIL (AT KM 13.8) This 0.8 km walk introduces you to the ecology of a typical Algonquin hardwood forest and culminates in a fine view of Smoke Lake and the surrounding maple hills.

MIZZY LAKE TRAIL (AT KM 15.4) This 11 km trail requires an early start and a full day to do properly. It visits nine ponds and small lakes and affords some of the best chances to see wildlife in the Parkway Corridor.

PECK LAKE TRAIL (AT KM 19.2) The Peck Lake Trail is 1.9 km long and goes completely around the shoreline of Peck Lake before returning you to the parking lot. The trail guide explores the ecology of a typical Algonquin lake.

TRACK AND TOWER TRAIL (AT KM 25) A 7.7 km loop featuring a spectacular lookout over Cache Lake, this trail introduces you to some fascinating history. A 5.5 km optional side trip follows an abandoned railway to Mew Lake.

HEMLOCK BLUFF TRAIL (AT KM 27.2) This 3.5 km loop leads through mixed forest to an impressive view of Jack Lake. The guide presents results of research in Algonquin.

BAT LAKE TRAIL (AT KM 30) This 5.6 km loop introduces you to basic Park ecology while visiting a beautiful hemlock stand, a fine lookout, and acidic Bat Lake.

LOOKOUT TRAIL (AT KM 39.7) This 1.9 km loop is a fairly steep and rugged trail which rewards the hiker with a magnificent view of several hundred square kilometres of Algonquin. The trail guide discusses the geology of the Park.

BOOTH'S ROCK TRAIL (8 KM SOUTH FROM KM 40.3) This 5.1 km loop visits two lakes and a spectacular lookout, returning via an abandoned railroad while the guide discusses man's impact on the Park.

SPRUCE BOG BOARDWALK (AT KM 42.5) Several boardwalk sections in this 1.5 km loop give you an excellent close-up look of two typical northern spruce bogs. Their ecology is discussed in the guide.

BEAVER POND TRAIL (AT KM 45.2) A 2.0 km loop yields excellent views of two beaver ponds while the guide provides an introduction to Algonquin's fascinating beaver pond ecology.

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